

WHAT IS CLAIMED IS:

1. A composition of matter comprising copper dispersed on a porous rare earth halide support.

5 2. The composition of Claim 1 wherein the porous rare earth halide support has a BET surface area greater than 5 m²/g.

10 3. The composition of Claim 2 wherein the porous rare earth halide support has a BET surface area greater than 15 m²/g.

15 4. The composition of Claim 1 wherein the rare earth halide support is represented by the formula MX₃, wherein M is at least one rare earth lanthanum, cerium, neodymium, praseodymium, dysprosium, samarium, yttrium, gadolinium, erbium, ytterbium, holmium, terbium, europium, thulium, lutetium, or mixtures thereof; or wherein X is chloride, bromide, or iodide.

20 5. The composition of Claim 4 wherein X is chloride, M is lanthanum, and the rare earth halide support is lanthanum chloride.

25 6. A composition of matter comprising copper dispersed on a porous rare earth oxyhalide support.

7. The composition of Claim 6 wherein the porous rare earth oxyhalide support has a BET surface area greater than 12 m²/g.

25 8. The composition of Claim 7 wherein the porous rare earth oxyhalide support has a BET surface area greater than 20 m²/g.

30 9. The composition of Claim 7 wherein the rare earth oxyhalide support is represented by the formula MOX, wherein M is at least one rare earth lanthanum, cerium, neodymium, praseodymium, dysprosium, samarium, yttrium, gadolinium, erbium, ytterbium,

holmium, terbium, europium, thulium, lutetium, or mixtures thereof; or wherein X is chloride, bromide, or iodide.

10. The composition of Claim 9 wherein X is chloride, M is lanthanum, and the rare
5 earth oxyhalide support is lanthanum oxychloride.

11. A method of using a porous rare earth halide as a catalyst support comprising
depositing one or more catalytic components onto the porous rare earth halide support.

10 12. The method of Claim 11 wherein one or more metals or metallic ions are
deposited onto the porous rare earth halide support, the metals or metallic ions being the
elements of Groups 1A, 2A, 3B, 4B, 5B, 6B, 7B, 8B, 1B, 2B, 3A, 4A, or 5A of the
Periodic Table.

15 13. A method of using a porous rare earth oxyhalide as a catalyst support comprising
depositing one or more catalytic components onto the porous rare earth oxyhalide support.

20 14. The method of Claim 13 wherein one or more metals or metallic ions are
deposited onto the rare earth oxyhalide support, the metals or metallic ions being the
elements of Groups 1A, 2A, 3B, 4B, 5B, 6B, 7B, 8B, 1B, 2B, 3A, 4A, or 5A of the
Periodic Table.

25 15. The method of Claim 13 wherein after one or more catalytic components are
deposited onto the rare earth oxyhalide support, the support is contacted with a source of
halogen under conditions sufficient to convert the rare earth oxyhalide support to a rare earth
halide support.

16. The method of Claim 15 wherein the source of halogen is hydrogen chloride or
molecular chlorine.